
ENERGY QUEST 2016

OVERVIEW

The 2nd International Conference on Energy Production and Management (ENERGY QUEST 2016) took place in Ancona, Italy, organised by the Polytechnic University of La Marche, represented by Professors Fabio Polonara and Giorgio Passerini, the Ural Federal University represented by Professor Elena Magaril and the Wessex Institute represented by its Director, Professor Carlos A. Brebbia.

The meeting followed the success of the first conference held in Ekaterinburg, home of the Ural Federal University. That meeting led to a wide range of collaborative projects with several research groups around the world, including some working at the University of La Marche.

The success of Energy Quest 2014 in Ekaterinburg was also in terms of publications, comprising books as well as journal papers. The conference saw the launching of the new International Journal of Energy Production and Management now entering its second year. The Journal has attracted excellent papers.

The Conference encompasses conventional energy sources, particularly hydrocarbons with a number of other ways of producing energy, emphasising new technological developments based on renewable resources.

The changes needed to progress from an economy based mainly on hydrocarbons to one focussed on renewable energies require substantial studies and investment.

The meeting also discussed the emerging use of industrial processes, including the embedded energy of materials. Energy production, distribution and usage, result in environmental risks which need to be better understood. They are part of the energy economics equation.

OPENING OF THE CONFERENCE

The conference was opened by Professor Carlos A. Brebbia, Director of Wessex Institute, who explained the motivation for his Institute to support the conference series. One important function of the Wessex Institute – Carlos said – is to promote the exchange of scientific information throughout the world.

Conferences are an important part of these objectives and have always been very successful since the programme started thirty years ago.

Another unique activity of Wessex Institute is the support of an eLibrary on the web where all papers presented at the International conferences or published in WIT Press journals are archived in digital format. The Institute's policy is to offer them in Open Access format so that they can be freely downloaded. This has contributed to the further dissemination of the Institute's work as reflected by the growing number of citations the papers receive.



Opening address

Associated to this, is the launching of a series of new Journals trying to cover areas which are not sufficiently taken into consideration in other publications, particularly those related to interdisciplinary fields.

In addition to the well-established journals, such as Sustainable Development and Planning, Design and Nature, Safety and Security Engineering, and Computational Methods and Experimental Measurements, the Institute has launched three new journals, the most relevant of which for the conference is the one already mentioned on Energy Production and Management, in conjunction with the Ural Federal University.

Other new journals are on Transport Development and Integration and Heritage Architecture, both responding to the demand from several research groups and international conferences. They have been well received by the community.

Carlos also mentioned that a large part of the Institute's research and development work is based on the boundary element method, a technique developed when he was at Southampton, and that has been the trademark of Wessex Institute since its beginning. Note that in 1986 when the Wessex Institute started, the original boundary element expertise moved from Southampton University to the new Institute.

Carlos finished his welcoming address by thanking the participants for their contribution to the conference and, in particular, the two other institutions involved, i.e. the Polytechnic University of La Marche and the Ural Federal University.

WELCOMING ADDRESSES

Professor Elena Magaril from the Ural Federal University welcomed the delegates in the name of her Institution. She reminded the delegates that the first conference on Energy Production and Management took place in Ekaterinburg and introduced a number of cooperative agreements between her University and other institutions all around the world.

UrFU has also launched an International Journal of Energy Production and Management in conjunction with the Wessex Institute which is now in its second year of publication.

The next speech was Professor Giorgio Passerini from the Polytechnic University of La Marche, who pointed out his long association with Wessex Institute, during which period many initiatives were carried out.

Giorgio particularly referred to the importance of the recent agreement between USA and China to reduce emissions in the near future. This represents the beginning of the major powers to take air pollution resulting from energy usage seriously. It paves the way for a better future for next generations.

Giorgio explained that his University, which is very dynamic and a comparatively young institution, is keen to be associated with research groups from all over the world and happy to support initiatives such as this conference.

INVITED PRESENTATIONS

There were a series of invited presentations, as follows:

- “Analysis of Russian UGS capacity in Europe”, **Ove Gudmestad**, University of Stavanger, Norway.
- “Production of nutrients for non-edible plants using anaerobic baffled horizontal wetland system”, **Shamsul Mohamed Kutty**, University of Technology Petronas, Malaysia.
- “PCDD/F emissions from virgin and treated wood combustion”, **Giorgio Passamani**, Insubria University of Varese, Italy.
- “Improvement of the pyrolysis process”, **Elena Magaril**, Ural Federal University, Russia.
- “Energy management as production input”, **Giovanni Perillo**, University of Naples Parthenon, Italy.

CONFERENCE TOPICS

The papers presented at the conference were grouped under the following topics:

- Energy policies
- Biomass and biofuels
- Energy production and related pollution
- Energy efficiency
- Energy management
- Renewable energies

SPECIAL SESSION

A special session took place during the second day of the conference at the Aula Magna of the University of La Marche in the centre of Ancona, where the delegates were taken by bus.

Professor Fabio Polonara welcomed the delegates in the name of the University and was especially pleased to see the Wessex Institute conferences back in Ancona.

He referred to the importance of presenting scientific facts in energy matters and not to have uninformed decisions in the hands of politicians.

Carlos then expressed his appreciation to the University of La Marche with which the Wessex Institute has numerous links in the form of projects as well as conferences and other research activities.

Carlos explained that his Institute tries to build bridges between different disciplines by bringing projects together, something WIT has been successfully doing for over thirty years. The Institute is aware that it depends on the goodwill of the community which reflects the success in achieving its ends.

Professor Giorgio Passerini also welcomed the delegates in the name of his University of La Marche and hoped that they would have time to see some of the sights in Ancona, a very old and strategic city that has attracted many tradesmen as well as invaders over its long history.

The sessions at the Aula Magna of the University of La Marche in Ancona, comprised of the following presentations:

Dr Rock Boothroyd

The first keynote address was by Dr Rock Boothroyd, independent consultant, lately from the University of Queensland, Australia, who in his own words is trying to pay back to the world some of the benefits received earlier in his career. His talk on “Integrated Molten Salt Nuclear Reactor Systems for base-load power plants” was a reflection of his experience in the nuclear industry. He discussed the advantages of this type of reactor which can supply the background power for further integrated energy systems.

Professor Hussain Al-Kayiem

The next keynote address was given by Professor Hussain Al-Kayiem from Petronas University in Malaysia. Hussain has considerable experience in the field of energy systems, ranging from conventional sources to renewable energies; with expertise in the development of technical equipment. His presentation described a normal renewable energy system based on the use of solar energy, using the updraft from a tall chimney where air is heated by the sun. The system ensures a continuous delivery of energy by being able to store the heat in a water pipe network underneath the heat absorbing surface surrounding the chimney. Some updraft power plants have been built in Australia, Spain and Namibia, amongst others. Hussain proposed a new version based on vortex induced flow.

Dr Elena Cristina Rada

Dr Elena Cristina Rada from the University of Trento gave another keynote address with the topic of Environment Pollution from waste and biomass energy generation. She referred to the challenge that population growth and use of energy present regarding the increase in emissions.

Elena investigated the local impact of waste to energy plants, solid waste and the use of wood combustion. Her research indicates that all these technologies can be environmentally friendly if they are carried out properly. Even wood combustion can use very clean technologies.

The analysis made by Elena will help to understand better the different systems available to provide clean waste and biomass processing, leading to an improvement in Air Quality.

Professor Yogesh Jaluria

The keynote address by Professor Yogesh Jaluria of Rutgers University, USA was entitled “Simulation of thermal transport processes to reduce environmental impact and improve output”. He went over a series of industrial applications in which the process has been optimised to minimise the adverse effects on the environment. Yogesh also referred to the damaging environmental effects of air contamination in soil and water.

It is essential to combine the experimental, analytical and computational methods to obtain the best possible results and validate the simulation in order to reduce energy emissions and optimise the use of energy. The research needs to focus more on environmental impact.

Professor Bengt Sundén

The last invited presentation in the Special Session was by Professor Bengt Sundén from Lund University in Sweden, on the topic “On modelling of transport phenomena in thermoelectric systems for trigeneration”. His talk discussed how to change a thermoelectric generator module. The analysis requires a multiscale and multiphase approach. The research demonstrates that the best strategy for making the thermoelastic devices efficient is to choose the right materials.

The presentations were all well received and followed by productive discussions.

At the end of the talks, Carlos awarded the keynote speakers an Eminent Scientist Award from the Wessex Institute. This was a medal depicting the New Forest Dragon based on a legend dating back from the time of the Saxons. The dragon is part of the ancient flag of Wessex (i.e. the West Saxon country). The standard was raised for the last time during the Battle of Hastings which marked the end of the Saxon kingdom and the invasion of England by the Normans. The New Forest then became the hunting ground of the new King, William the Conqueror.

The medals were in appreciation of the speakers for their scientific achievements, as well as for their support of the Wessex Institute and the conferences.

SOCIAL OCCASIONS

The Conference Dinner took place in the idyllic site of the Fortino Napoleonico, now a hotel and excellent restaurant.

The Fortino was built at the time of Napoleon to protect the Adriatic Coast against possible invasion from England and other nations opposed to the Napoleonic rule. It has a commanding position of the coastline which the delegates could appreciate during the pre-dinner drinks on the terrace.

Dinner was served in one of the old bastions where the delegates had an opportunity to taste some of the local fish dishes accompanied by the excellent white wines for which La Marche is renowned throughout the world.

Giorgio Passerini said a few words at the beginning of the banquet and offered a toast to the continuous success of the conferences, stating how nice it was to see so many nationalities represented at the meeting.

The night was most pleasant and helped to strengthen the links between delegates. This was one more opportunity for them, in addition to lunches and coffee breaks, to become better acquainted with each other.

The success of this and other WIT meetings – Giorgio said – is in great part due to the friendly atmosphere created at WIT conferences.

A special concert was arranged during one of the conference evenings. It was a piano recital by Pier Paolo Strona who, following an early career as a research engineer at FIAT R&D in Torino, concentrated on his skills as a musician. Pier Paolo is now an excellent piano and organ player who has participated as such in many of the Wessex Institute's activities.

His recital consisted of pieces by J. S. Bach (*Fantasia Cromatica e Fuga*), Mozart (*Fantasia*) and Beethoven (*Sonata Quasi Una Fantasia*). His performance was very well received by the delegates.

Pier Paolo was also one of the first scientists to apply boundary element methods for the solution of aerospace problems.

He has published several books, a major work on Bach's *Goldman* variations and others, including his photographs and dealing with different subjects. His current interests are in researching the common basis of music and other cultural manifestations such as language, architecture and figurative arts.

At the end of the concert the participants were given a CD of music by Pier Paolo entitled "Music from the New Forest at Wessex Institute" which contains not only pieces from the above mentioned composers, but also from Gurdjieff, Scarlatti, Joplin and Piazzolla, amongst others. The diverse composers demonstrate the wide range of Pier Paolo's musical interests.

CLOSE OF THE CONFERENCE

The conference was closed by Carlos who expressed his gratitude as well as that of the two co-organisers from the local Polytechnic University of La Marche and the Ural Federal University. The excellent presentations will ensure that the meeting is reconvened in 2018 in a location and at a date soon to be confirmed.

Carlos invited all participants to visit the Wessex Institute campus next time they are in the region.